Site-Specific Quality Assurance Project Plan (SSQAPP)
Addendum 2A, Revision 0

Phase II Environmental Site Assessment (ESA)
Former Monroe St. School
1100 West Monroe Street
Salisbury, Rowan County, North Carolina

EPA Brownfields Cooperative Agreement BF-00D72618-0

This document and work performed under this Site-Specific QAPP Addendum 2A is prepared in accordance with the EPA Region 4 Brownfields Program and the Generic QAPP document for the City of Salisbury, North Carolina Approved August 22, 2019.

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Prepared by:

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April 29, 2020

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Signature

Joe Morici, PE

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EPA Project Officer:

CINDY NOLAN Digitally signed by CINDY NOLAN Date: 2020.06.12 12:11:31 -04'00'

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EPA Designated Approving Official (DAO):

Cindy J Nolan 6/12/2020

Signature

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City of Salisbury Planning Director:

Signature

Hannah Jacobson

Printed Name / Date

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A3. DISTRIBUTION LIST

The following individuals will receive copies of the approved QAPP and subsequent revisions:

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- Joe Morici, PE, Cardno Brownfields Director/Project Manager, 10988 Richardson Road, Ashland, Virginia 23005, Phone: (803) 960-2069, Email: Joe.Morici@cardno.com
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- Brian Kvam, PG, Cardno Field Team Leader, 1801 Lincoln St., Suite 301, Columbia, SC 29201, Phone: (803) 929-6071, Email: brian.kvam@cardno.com
- Cardno Field Team Technicians, Richmond, VA Office, 10899 Richardson Rd., Ashland VA 23005; Columbia, South Carolina Office, 1812 Lincoln St., Suite 301, Columbia, SC 29201
- Haynes Campbell, Pace National Analytical Services, Inc., Project Manager, 9800 Kincey Avenue Suite 100, Huntersville, NC 28078, Phone: (704) 977-0939, Email: hcampbell@pacenational.com

A4. PROJECT/TASK ORGANIZATION

Cardno was selected by the City of Salisbury as their Qualified Environmental Professional (QEP) and is responsible for conducting and overseeing the Phase II ESA at the subject property funded by the brownfields program. The information presented in this document represents the minimum standards required for the site assessment. A project organization chart is included in **Appendix A**. The following are the individuals participating in the project and their specific roles and responsibilities:

Cindy Nolan, EPA Region 4 Brownfields Project Officer - The EPA Project Officer is responsible for overseeing and monitoring the grant. As part of that responsibility, she ensures the processes described in the work plan are followed and the terms and conditions of the grant are met.

Cindy Nolan, EPA Region 4 Brownfields Designated Approving Official – The Brownfields Region 4 Quality Assurance Manager's DAO provides technical assistance to the Region 4 Project Officer working on Brownfields sites. The DAO's role is to provide technical reviews of the Generic QAPPs and Site-Specific QAPP Addenda that are generated. This includes the approval of the Generic QAPP and Site-Specific QAPP Addenda and any revisions.

Hannah Jacobson, City of Salisbury Brownfields Planning Director – The City of Salisbury Brownfields Planning Director (Director) is responsible for the overall strategic direction of the project. The Director ensures project activities are executed in accordance

with the approved Work Plan and the Terms and Conditions of the Cooperative Agreement.

Joe Morici, PE, Cardno Project Manager – The Project Manager will be the primary decision maker for the project and the primary user of the data to determine whether or not further action is required at the site. He will also coordinate the project activities and his specific responsibilities are:

1. Approving the QAPP and subsequent revisions in terms of Brownfields specific requirements;
2. Overall responsibility of the investigation;
3. Coordinating field and laboratory activities;
4. Conducting project activities in accordance with the QAPP and work order;
5. Validating field data;
6. Reporting to the City's Brownfields Program Director regarding the project status per the work order and preparing interim and final reports the City;
7. Making final project decisions with the authority to commit the necessary resources to conduct the project;
8. Instituting corrective actions for problems encountered in the field sampling activities;
9. Communicating corrective actions to the Field Team Leader to remedy problems encountered in the field and coordinating with the lab director to correct any corresponding problems encountered in the chemical analyses;
10. Compiling documentation detailing any corrective actions and providing them to the City Project Director.

Charles Saunders, PG, Cardno QA/QC Reviewer – The Cardno QA/QC Reviewer provides documentation audits and technical review to assist in promoting, implementing, and documenting QA compliance. The Cardno QA/QC Reviewer is isolated from the implementation Cardno Project Manager. This allows lateral support as a peer to the Cardno Project Manager without introducing unintentional biases from conducting the work.

Brian Kvam, PG, Cardno Field Team Leader – The field team leader will perform the following duties:

1. Select the field sampling team;
2. Conduct the field activities per the approved QAPP and supervise the field sampling team;
3. Distribute the approved QAPP and subsequent revisions to the members of the field sampling team;
4. Report problems in the field to the Cardno Project Manager;
5. Implement corrective actions in the field as directed by the Cardno Project Manager. Corrective actions will be documented in the field logs and provided to the Cardno Project Manager in the final report.

Cardno Field Team Technicians – These individuals will perform the actual fieldwork per the QAPP and at the direction of the field team leader. The field team typically consists of two to four people and will be named at a later date by the field team leader.

Haynes Campbell, Pace National Account Executive, Laboratory Project Manager

– The Laboratory Project Manager is responsible for the following:

1. Coordinating the analysis of the samples and the laboratory validation of the data;
2. Coordinating the receipt of the samples at the laboratory, selecting the analytical team, ensuring internal laboratory audits are conducted per the Laboratory's Quality Assurance Manual (QAM), and distributing the applicable sections of the QAPP and subsequent revisions to members of the analytical team;
3. Instituting corrective actions for problems encountered in the chemical analyses and reporting laboratory problems affecting the project data to the Cardno Project Manager and Cardno QA/QC Reviewer. Corrective actions for chemical analyses will be detailed in a QA report that will be provided via electronic and conventional mail.

A5. PROBLEM DEFINITION/BACKGROUND

The City of Salisbury, North Carolina, has been issued a Brownfields Assessment Grant under the USEPA Cooperative Agreement No. BF-00D72618-0. Portions of the funding from this grant will be utilized to conduct an Underground Storage Tank (UST) system closure and Phase II Environmental Site Assessment (ESA) of the former Monroe St. School (hereinafter referred to as the Site or Subject Property) located at 1100 West Monroe St. in the City of Salisbury, Rowan County, North Carolina.

Cardno previously conducted a Phase I ESA in December 2016 per ASTM #1527-13 to evaluate the potential for recognized adverse environmental conditions (RECs) at the Subject Property. The Phase I ESA was performed to satisfy the requirements of the City of Salisbury and their assign(s) with respect to potential environmental impairment associated with the property due to contamination by hazardous substances, controlled substances, or petroleum products on or near the site. The Phase I ESA revealed the following RECs in connection to the Subject Site:

1. The presence of an UST in the fenced area on the southeast side of the school building.

2. The presence of a former filling station on the corner of Monroe Street and Lloyd Street on a parcel adjacent to and upgradient of the school.

While not specified as an REC in the Phase I ESA, Cardno is also proposing to collect soil samples from around the former mechanical room area in order to assess near surface soil conditions that have the potential to cause a vapor intrusion condition into the existing structure.

This Site-Specific QAPP and Phase II ESA were developed to determine if the identified RECs have impacted the Subject Site parcel above regulatory cleanup criteria and/or would impact redevelopment. The scope of work presented in the Site-Specific QAPP will result in the closure of the UST system that will eliminate a potential on-site source of contamination, assess the UST system for a potential release, and collect information that will assist in making risk management decisions for property redevelopment.

Based on the most recent North Carolina Department of Environmental Quality (NCDEQ) UST Regulations (*Guidelines for Site Checks, Tank Closure, and Initial Response and Abatement for UST Releases, March 1, 2007 Version Change 9, Effective February 1,*

2019) and the estimated size of the tank (2,000 gallons), Cardno has determined that the UST falls in the Non-regulated, Commercial Tank category. As such, the UST Guidance says to follow the procedures for assessment and initial response actions per the regulated tank requirements.

A5.1 Site Location and Description

The Site is located at 1100 West Monroe Street (site) in Salisbury, Rowan County, North Carolina. The site is approximately 3.68 acres with Parcel ID number 008 068. The Site is the former Monroe Street School, also known as the Samuel E Duncan School, and the property has most recently been used for classrooms and offices by Livingstone College. In addition, a separate modular building on the site is used by Head Start. The parcel includes the old school building, modular building, parking lot, athletic field, grass lawns with perimeter fence. The main school building includes the offices, classrooms and auditorium. In the vicinity, the surrounding properties are predominately residential and institutional use with Livingstone College located across Monroe Street.

A Site Location Map, consisting of the relevant portion of the United States Geological Survey (USGS) topographic map, Salisbury, N.C. quadrangle, is included as **Figure 1**. A plan view of the Subject Property is portrayed on **Figure 2**, which includes the approximate Subject Property boundaries, as provided by the Rowan County GIS Department, and an aerial photograph depicting the Site with the approximate location of the UST system outlined.

A5.2 Site and Regional Characteristics

According to the Geologic Map of North Carolina, produced by the State of North Carolina in 1985, the Site lies in the Charlotte Belt of the Piedmont Physiographic Province of North Carolina. The predominant rock type at the Site has been identified as granite. The shallow subsurface in most areas of the Piedmont contains residual soil overburden, including structure-free residuum, saprolite, and partially weathered rock (PWR) that derive from in-place weathering of the crystalline bedrock. Occasional areas containing recent deposits of alluvium in the uppermost subsurface are found near streams and rivers. Saprolite and PWR typically contain some relict structures from the original rock material. Depth to rock ranges from ground surface at occasional outcrops to depths of greater than 100 feet in areas of easily weathered rock.

The shallow aquifer occurrence varies in depth from ground surface at springs, creeks, and rivers to as deep as 50 feet or more beneath upland surfaces in some parts of the Piedmont. Water in the alluvium or unconsolidated residual material, including saprolite and PWR, usually behaves as an unconfined, or water table, aquifer and will yield water with head elevation equivalent to the first elevation where water is encountered. Permeability varies with lithology and is typically relatively low in residual soils, with higher permeability in saprolite or PWR due to relict rock texture and the variable susceptibility to weathering exhibited by different minerals in the rock. Groundwater flow in residual soils or alluvium is usually in rough concurrence with local topographic conditions and is toward local drainage features.

The bedrock fractures or other planar features generally constitute the bedrock aquifer, with the surrounding rock material being effectively impermeable. Along with fractures, contacts between rock bodies probably constitute zones of significant groundwater

occurrence in the bedrock. The surrounding material and overlying residuum tend to make the bedrock aquifer a semi-confined aquifer. That is, the overlying water and soil weight normally results in pressure that causes water in a borehole which intersects a fracture or other feature to rise above the elevation of the fracture or feature. Such features may not occur on predictable trends, at the same elevations, or even be present or directly connected in separate boreholes. In areas adjacent to creeks the bedrock groundwater generally discharges to the residuum or alluvium and then into the surface water. In upland areas away from surface water drainages, the bedrock aquifer is generally recharged by downward infiltration of residuum or alluvial aquifer water at locations where fractures intersect the bedrock surface.

Groundwater in the Piedmont physiographic province is typically found in unconfined or semi-confined conditions with a flow that generally mimics the surface topography. The USGS Topographic Map, Salisbury, NC Quadrangle (**Figure 1**), indicates that groundwater is expected to follow the Site topography by flowing southwest.

A5.3 Current and Historic Uses of the Site

The approximately 3.68 acre parcel is predominantly vacant except for a modular office building used by Head Start; the school building proper has been vacant for almost two decades. Additionally, students from Livingstone College are using the site for parking.

Until the approximately 20 years ago, the site was developed and operated as a school. Additionally, a gas station was previously located across Lloyd St. in an apparent upgradient direction from the site.

A5.4 Previous Site Assessments

Cardno completed a Phase I ESA of the Subject Property in December 2016. During this assessment, as stated above, Cardno identified the following RECs:

1. The presence of an UST in the fenced area on the southeast side of the school building.

2. The presence of a former filling station on the corner of Monroe Street and Lloyd Street on a parcel adjacent to and upgradient of the school.

A5.5 Contaminants of Potential Concern

The onsite UST could have released petroleum products to the subsurface. While no information was discovered about the size or contents of the UST, it appears to be consistent with use as a fuel oil UST that would have run the boiler system at the school. The UST system is still in place. Nearby historic filling station could have released fuel during their operations. Chemicals of concern related to these RECs include petroleum constituents, total petroleum hydrocarbons (TPH), volatile organic compounds (VOCs), and semi-volatile organic compounds (SVOCs). Additionally, given the mechanical room area and typical maintenance activities, as well as the existence of adjacent former automotive servicing facilities, lead and other Resource Conservation and Recovery Act (RCRA) metals could also be present. Therefore, metals are also considered contaminants of concern (COCs) for the Site. Additionally, used oil and/or leaded gasoline may have been used given the age of the site and adjacent gas station, so heavy metals are a potential contaminant of concern.

A5.6 Areas of Concern (AOCs)

Cardno has identified the following items/areas of concern (AOC) as the focus of this Phase II ESA:

- UST system and basin
- Off-site and adjacent former gas station
- Mechanical room area

A5.7 Purpose of Phase II Assessment

The City is seeking to support Livingstone College and their partners' efforts to redevelop of the site by providing Brownfields funds to investigate the RECs identified during the Phase I ESA. This QAPP has been prepared to meet this goal in support of potential redevelopment efforts. The UST system closure is necessary to properly assess the possibility of a historical release. Information from the UST system closure and additional site assessment will be used to determine if site media have been impacted by contaminants of concern, as well as determining the need for initial abatement/mitigation and/or further assessment. The project-specific data quality objectives (DQOs) for the site are summarized in **Table 1**.

A6. PROJECT/TASK DESCRIPTION AND SCHEDULE

In addition to the laboratory analysis of surficial soils and groundwater (critical determinations); non-critical determinations, including soil lithology, visual and olfactory observations, and general observations, will also be made to aid in the decision making process.

The scope of work described in subsequent sections will be completed in two phases.

1. The initial phase will include the closure via removal of the USTs remaining on-site and the collection of soil and groundwater samples.
2. In the final phase, the data collected will be evaluated to determine the need for further assessment, which could include additional soil, groundwater, and/or vapor sample collection, or remediation planning. The need for further assessment or remediation planning will be evaluated with input from all project stakeholders as described in the generic QAPP. If needed, additional assessment work scopes will be detailed in revisions to this QAPP.

A6.1 Sampling Plan

Soil samples will be collected in accordance with NCDEQ UST Guidance, and the judgement of qualified Cardno personnel. If field conditions do not allow for pre-determined sampling locations to be utilized, the field team leader will utilize the Decision Tree (included in the Generic QAPP) to determine the appropriate action. All deviations and decisions will be documented in the final Phase II ESA report. Proposed soil sample locations are illustrated in **Figure 3**. Proposed monitoring well locations are depicted on **Figure 4**. The wells will be constructed according to 15A NCAC 2C Well Construction Standards as shown on **Figure 5**.

Table 2 provides a summary of the analysis criteria for each sample including QA/QC samples. The field staff will be provided a copy of this plan for reference while in the field. Boring (if needed) and soil sample collection activities will be conducted in accordance

with the USEPA Region 4 Science and Ecosystem Support Division (SESD) Field Branches Quality System and Technical Procedures and NCDEQ UST Guidance.

The investigation derived waste (IDW) generated during the assessment activities will consist of soil cuttings and purged groundwater. The volumes produced are expected to be minimal. All IDW will be containerized in 55-gallon drums and stored on-site pending the results of laboratory analysis for waste characterization. Based on the analytical results, the IDW will be characterized and disposed of properly.

A6.2 Field Measurements

Soil samples from UST system excavation will be field screened for organic vapors via headspace analysis using a PID and by visual/olfactory observations.

Subsequent to monitoring well installation and development, the monitoring wells will be allowed to recover and equilibrate overnight. Prior to groundwater sample collection, each monitoring well will be purged using a variable speed peristaltic or submersible pump with new dedicated tubing until the monitoring well formation fails to recharge (i.e., the well runs dry) or consistent values (i.e., less than 10% variance between consecutive readings) are obtained for pH, temperature, dissolved oxygen and specific conductivity. Turbidity will be monitored during purging with a calibrated turbidity meter. These measurements will be recorded during the purging process to ensure that representative groundwater samples are obtained.

A6.3 Laboratory Testing

Based on the NCDEQ UST closure requirements and additional assessment objectives, full reportable lists of compounds within the following analytical method categories have been identified for this additional assessment in soil and groundwater, and include the following:

- TPH Diesel Range Organics (DRO) by EPA Method 8015
- TPH Gasoline Range Organics (GRO) by EPA Method 8015
- Massachusetts Department of Environmental Protection (MADEP) Volatile Petroleum Hydrocarbons (VPH)
- MADEP Extractable Petroleum Hydrocarbons (EPH)
- TCL VOCs by EPA Method 8260
- TCL SVOCs by EPA Method 8270
- Resource Conservation and Recovery Act (RCRA) Metals by EPA Method 6010

The listing of accredited analyses, detailing all analytes, is provided in the Pace National Analytical Services, Inc. (Pace) QAM included as **Appendix B**.

A6.4 Soil Samples (Critical)

Based on the estimated size (2,000 gallons) of the UST, three soil samples will collected from beneath the center line of the tank. Cardno does not anticipate any significant length of product piping for samples to be collected in addition to the tank locations. Five additional soil samples are proposed to be collected; two subsurface samples to check for soil contamination from the across the street former gas station and three subsurface samples from around the former mechanical room area.

There are no critical sampling conditions (e.g. storm event, seasonal flow conditions, etc.) under which these samples should be collected. Data from these samples will be used to determine the absence or presence of COCs in Site soils and will identify the need for additional assessment (soil or vapor) and/or remediation.

A6.5 Groundwater Samples (Critical)

To assess groundwater at the site, Cardno proposes to install one monitoring well at the UST basin, one monitoring well near the mechanical room, and one monitoring well to check for potential groundwater migration of a contaminant plume from the former gas station.

There are no critical sampling conditions (e.g. storm event, seasonal flow conditions, etc.) under with these groundwater samples should be collected. The information collected from the monitoring well samples will be used to determine the presence or absence of COCs in groundwater. These data will determine the need for additional assessment and/or remediation.

A6.6 Non-Critical Determination

Non-critical determinations made during the soil boring installation/soil sample collection activities will include describing soil characteristics, such as lithology, color, grain size, and olfactory observations. This information will be used to supplement the critical data; it is not needed to make the decision of whether or not remediation is necessary.

A6.7 Regulatory Standards

UST systems are regulated by the NCDEQ Division of Waste Management (DWM) under the regulation found in Title 15A of the North Carolina Administrative Code (NCAC), subchapters 2N and 2L. The statutes include soil screening values for the COPCs. According to NCDEQ UST guidance, if the results of the site check indicate that soil contamination equals or exceeds 50 milligrams per kilogram (mg/kg) TPH GRO or 100 mg/kg DRO, groundwater exceeds the 2L standards (North Carolina Groundwater Standards (2L Standards; Title 15A, NCAC, Subchapter 2L, Part .0202)), or free product is present, initial response and abatement actions must be performed.

Additional soil data will be compared to the latest version industrial USEPA Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites. Groundwater samples will be compared to North Carolina 2L Groundwater Standards and the most recent EPA Maximum Contaminant Levels (MCLs).

A6.8 Data Use

Soil samples will be collected to provide analytical data for UST closure assessment. The significance and nature of impacts to the areas of concern will be determined by direct evaluation of the analytical data generated. If analytes are not detected or are detected in the soil samples at concentrations below the soil criteria of 50 mg/kg GRO or 100 mg/kg DRO set forth in NCDEQ UST guidance, if no analytes are detected in groundwater above the groundwater quality standard established in 15A NCAC 2L.202, and no free product is present, then no further action will be required for the UST closure.

If analytes are found above regulatory criteria in the soil or groundwater, then the degree to which these impacts affect redevelopment of the site must be evaluated. Further

assessment and/or an Analysis of Brownfields Cleanup Alternatives (ABCA), which may evaluate remedial actions and/or institutional controls, would then be recommended. Additionally, if related to the UST closure assessment, a 24-Hour Report, a 20-Day Report and Initial Abatement Action Report would need to be prepared and submitted to the NCDEQ.

A6.9 Schedule

The anticipated start date for sample collection will be based on the final approval of this site-specific QAPP. The field activities will commence within 30 days of QAPP approval. Sample collection and associated field work should take approximately five days to complete. Samples will be shipped overnight to the laboratory throughout the duration of the project. Laboratory results will be sent to the Project Manager within 14 business days of sample receipt. The draft Phase II ESA report will be completed within 30 days after receipt of the laboratory results.

If a release is identified during the closure activities (TPH analysis $\geq$50 mg/kg GRO and/or $\geq$100 mg/kg DRO), a 24-Hour Report and/or a 20-Day Report and Initial Abatement Action Report may be required for submittal to the NCDEQ. If the findings of the assessment indicate that the site is eligible for a "No Further Action Required (NFAR)" status, then a UST Closure Report will be submitted to the NCDEQ within 30 days of the UST removal. If free product is discovered, then free product recovery must begin within 14 days and a Free Product Recovery System Specification Report would need to be prepared and submitted to the NCDEQ.

A7. QUALITY OBJECTIVES AND CRITERIA FOR MEASUREMENT DATA

During the Phase II ESA activities, soil and groundwater samples will be collected to adequately assess RECs identified in Cardno's Phase I ESA conducted on the Subject Property. Based on the previously identified RECs at the Site, full reportable lists of compounds for petroleum and metals have been identified for this assessment in soil and groundwater. As per NCDEQ guidance, soil and groundwater data will be compared to the regulatory standards identified in **Section A6.8**.

The selected laboratory methods are sufficient to meet the required detection levels. The Data Quality Objectives for this additional ESA are included as **Table 1**.

A8. SPECIAL TRAINING REQUIREMENTS/CERTIFICATION

The following are the minimum training requirements for personnel conducting project activities. Current training records and certificates are kept in personnel files located at the respective headquarters of the project personnel. Deficiencies and the need for new training are identified during annual personnel evaluations. Personnel deficient in any of the following requirements will not conduct project activities.

Hazardous Waste Operations and Emergency Response (HAZWOPER):

The Field Team Leader will ensure that all on-site project personnel have current certificates of training for the 40-hour Occupational Safety and Health Administration (OSHA) HAZWOPER Training Class with annual 8-hour refresher courses. All personnel mobilizing to the site shall carry a Certificate of Training identification card.

Field Team Training:

Field Team Technicians are provided hands-on training in graduated phases of explaining, observing, demonstrating, and performing field sampling techniques and standard operating procedures by experienced field personnel. Additional training in field equipment technologies, quality assurance, ethics, and other skills are provided through in-house instruction, online, and external workshops and courses. Field competency is checked through personnel evaluations with direct input from the field team leaders and project managers.

Certifications:

- Assessment work must be overseen by a NC-licensed professional, and the final assessment reports will be signed and sealed by either a professional geologist (P.G.) or a professional engineer (P.E.) licensed in the State of North Carolina;
- An NCDEQ-accredited environmental laboratory will perform the analysis of the environmental samples in compliance will all applicable regulations and standards.
- Monitoring wells will be installed by properly licensed North Carolina drillers.

Other training requirements and certifications are provided under the Generic QAPP document.

A9. DOCUMENTS AND RECORDS

Documentation and Records requirements provided under the Generic QAPP document.

B1. SAMPLING DESIGN PROCESS

The proposed site assessment will require performance of a UST system closure assessment and the evaluation of soil and groundwater impacts from potential onsite and offsite sources. Information from the site assessment will be used to determine if site media have been impacted by contaminants of concern and the need for initial abatement and further assessment. The proposed Phase II ESA will evaluate potential environmental impacts to soil and groundwater in areas of concern. Proposed sampling locations may be adjusted in the field based on Site conditions and features. A proposed soil boring location map is included as **Figure 3**. A proposed groundwater monitoring well location as **Figure 4**. The type and number of samples required, including the analytical methods, are provided in **Table 2**.

B1.1 UST Removal and Assessment

At least five (5) days prior to the UST closure, a Notice of Intent (UST-3) form will be completed and submitted to the NCDEQ.

One UST is believed to exist at the Site. The UST will be permanently closed by removal from the ground. The removal and assessment activities will be conducted in accordance with NCDEQ UST Guidance.

Upon removal of the tank from the ground, three (3) soil samples will be collected from the base of the UST basin. These samples will be collected from at approximately 10-feet spacing along the mid-line location of the former tank. Additional soil samples may be collected if soil staining is observed or in other areas where contamination is suspected.

Soil samples will be analyzed for TPH-GRO and TPH-DRO. Groundwater samples will be analyzed for VOCs by purge and trap capillary-column GC-MS, base neutral acids, volatile aromatics with xylenes, MADEP EPH, and MADEP VPH.

Soils excavated during the tank removal operations will be stockpiled on-site pending the results of laboratory analysis. Soil stockpiles will be bermed and covered with minimum 60-millimeter polyethylene sheeting. Additionally, NCDEQ UST guidance requires excavation of contaminated soil immediately upon determining that contaminant concentrations exceed the Action Level of 50 mg/kg TPH GRO or 100 mg/kg for TPH DRO. At the initial abatement stage, excavation is limited to no more than 533 cubic yards of soil, unless prior approval is obtained from the NCDEQ UST Section incident manager or compliance manager to return the soil to the excavation. Cardno intends to seek this approval and return all soil back to the excavation as fill material.

According to 15A NCAC 2T.1502 (4) stockpiled soil is considered contaminated if analytical results from samples collected during the assessment or from the stockpile show the presence of contaminants at or above the laboratory method detection level. Upon consultation with NCDEQ, contaminated stockpiled soil may be returned to the excavation.

If the stockpiled soils are returned to the basin, the remainder of the excavation will be backfilled to grade with clean soil. If the stockpiled material is removed from the site for treatment and disposal, the entire excavation will be backfilled to grade with clean soil.

In order to minimize losses due to volatilization during sample collection, samples for volatile analysis will be obtained directly from the excavator bucket or soil stockpile prior to homogenization. After collection of the VOC samples, the soil samples will be homogenized, and the remaining laboratory prepared sample containers will be filled.

The analytical results obtained during the UST system closure will determine whether or not further action is needed for the Site and whether a 24-hour Release and UST Release Report Form (UST-61), an Initial Abatement Report (including UST Closure Excavation, Post-Excavation Soil Contamination Assessment) will be required for submittal to the NCDEQ within 90 days, and, if needed, a Limited Site Assessment Report will be required for submittal to the NCDEQ within 120 days.

B1.2 Soil Boring Installation and Soil Sampling

Continuous soil cores will be collected at an additional five locations on the Subject Property, as illustrated on **Figure 3**, via a direct-push technology (DPT) rig using disposable cellulose acetate butyrate (CAB) core barrel liners. At the three locations surrounding the mechanical room area, cores will be pushed to approximately five feet below ground surface (bgs) and samples collected from the three to five foot interval. At the two locations near the property boundary with the former gas station across Lloyd St., cores will be pushed to the groundwater interface and soil collected from at least one foot above the interface or at where potential petroleum contamination is identified, either by visual or olfactory senses.

In order to minimize losses due to volatilization during sample collection, samples for VOC analysis will be obtained directly from the hand auger bucket or CAB liners, as applicable,

using a laboratory supplied, disposable sampling device and will not be homogenized prior to placement within the laboratory-prepared sample containers. After the samples for VOC analysis have been collected, the remaining portion of the specified soil sample interval will be placed in disposable, single-use, polyethylene bags for mixing and transferred to the applicable sample containers for the remaining analytes.

B1.3 Groundwater Sampling

Groundwater samples will be collected from three groundwater monitoring wells as depicted on **Figure 4**.

Groundwater levels will be gauged with an electric water level meter capable of measuring the depth to the air/liquid interface to within +/- 0.01 foot. Water level measurements will be collected from all wells on the Site within a 24-hour period to ensure that the groundwater flow gradient and direction can be accurately determined and are not affected by temporal variability. Groundwater elevations will be calculated based on the surveyed top of casing (TOC) elevations determined during site activities and will be prepared to illustrate the groundwater flow direction and gradient at the Site.

Prior to groundwater sample collection, each monitoring well scheduled for inclusion in the additional Phase II ESA will be purged via the low-flow method using a variable speed peristaltic pump and new dedicated tubing, or with a variable speed, electric submersible pump if groundwater depths prohibit the use of peristaltic pumps. Purging will continue until consistent values (i.e., less than 10% variance between consecutive readings) are obtained for dissolved oxygen, specific conductivity, and temperature, and consecutive pH measurements are within ± 0.2 pH units; or, if drawdown cannot be controlled during low-flow sampling, the monitoring well formation fails to recharge (i.e. the well runs dry). Turbidity will be monitored during purging with a calibrated turbidity meter. These measurements will be collected during the purging process to ensure that representative groundwater samples are obtained.

The monitoring wells will be sampled using low-flow techniques with a variable speed peristaltic pump (or with a variable speed, electric submersible pump if groundwater depths inhibit the use of peristaltic pumps). Groundwater samples will be collected and submitted for laboratory analysis as described in **Section A6.5**. Sample bottles for VOCs will be filled first, followed by bottles for the remaining additional analyses in order of decreasing volatility. Sample containers will be supplied by the analytical laboratory, and will be pre-preserved by the laboratory in accordance with the analytical method to be performed.

B1.4 Quality Assurance/Quality Control Samples

Quality Assurance/Quality Control (QA/QC) samples to be submitted for laboratory analysis will include one field blank, one trip blank, one duplicate soil sample, and one duplicate groundwater sample. Cardno plans to use all dedicated equipment and therefore is not proposing any equipment blanks. Should non-dedicated equipment be necessary, an additional equipment blank will be collected and submitted for analysis. The quality control samples will be labelled on the sample bottles and Chain-of-Custody forms as appropriate.

B1.5 Authorizations, Permits, and Clearances

On-site activities associated with this project will not commence until the proper authorizations, permits, and clearances are obtained, as applicable. These may include, but are not limited to, the following items:

- The Project Manager will ensure that the property owners have given written legal access to the property prior to accessing the properties.

- At least five (5) days prior to removing the UST system, the Field Team Leader will complete and submit an original signed UST-3 form to the NCDEQ UST Regional Office located in Mooresville, NC.

- At least 72 hours prior to the field activities, the North Carolina 811, Underground Utility Locating Center will be contacted to conduct a utility survey of the subject property. Where possible, a hand auger or post-hole digger will be used for the first three to four feet of borehole advancement before initiating mechanical drilling in order to minimize the potential for hitting underground utilities. In addition, any site maps available will be reviewed and a geophysical survey will be conducted, if necessary, to locate any underground pipelines, utilities, or structures.

- The Field Team Leader will contact the local fire marshal prior to removing the UST system. The fire marshal, and sometimes other local governmental agencies, have jurisdiction over USTs and may require oversight during removal.

B2. SAMPLING AND ANALYTICAL PROCEDURES REQUIREMENTS

To ensure that potential chemicals/contaminants of concern are identified, the soil and groundwater samples will be analyzed for the parameters as detailed in **Section A6**. The proposed sample locations for the Subject Property are depicted on **Figures 3 and 4**. **Table 2** provides a summary of sample locations and the respective analytical methods for each location. Based on conditions observed during implementation of the field activities, adjustments may be required to the sampling plan.

B3. SAMPLE HANDLING AND CUSTODY REQUIREMENTS

The laboratory QAM for Pace is provided in **Appendix B**. All other information pertaining to sample handling and custody requirements is provided in the Generic QAPP document.

B4. ANALYTICAL METHODS AND REQUIREMENTS

Once the samples are received and logged in at the laboratory, the samples will be analyzed by EPA Methods as specified in **Table 2**. The laboratory will supply results of analyses within 14 calendar days (standard turnaround time).

The laboratory will follow the procedures outlined in their QAM (**Appendix B**). The Project Manager will be responsible for overseeing the laboratory analysis and implementing corrective actions per their QAM. All other analytical information is provided in the Generic QAPP document.

B5. FIELD QUALITY CONTROL REQUIREMENTS

Quality control samples will be collected during field studies for various purposes which include the isolation of site effects (control samples) and the evaluation of field/laboratory variability (spikes and blanks, trip blanks, duplicates). One equipment blank (if needed –

planning to use all dedicated equipment), one field blank, one duplicate soil sample, and one duplicate groundwater sample will be collected. One temperature blank per sample cooler, and one VOC trip blank per sample cooler will be provided by the laboratory. Proposed blanks and duplicate samples are referenced in **Table 2**.

B6. LABORATORY QUALITY CONTROL REQUIREMENTS

Pace was selected to provide laboratory analytical services for this Site. The Pace laboratory QAM is included in **Appendix B**. All other laboratory quality control requirements are provided in the Generic QAPP document.

B7. FIELD EQUIPMENT AND CORRECTIVE ACTION

This information is provided in the Generic QAPP document.

B8. LAB EQUIPMENT AND CORRECTIVE ACTION

The laboratory QAM is provided in **Appendix B**, and all other information is provided in the Generic QAPP document.

B9. ANALYTICAL SENSITIVITY AND PROJECT CRITERIA

Method detection limits and reporting limits for each analytical method are provided in the laboratory QAM in **Appendix B**. Additional information is provided in the Generic QAPP document.

B10. DATA MANAGEMENT AND DOCUMENTS

Pace's QAM is provided in **Appendix B**. Additional information is provided in the Generic QAPP document.

C1. ASSESSMENT AND RESPONSE ACTIONS

Information pertaining to Assessment and Response Actions is provided in the Generic QAPP document.

C2. PROJECT REPORTS

Information pertaining to project reports is provided in the Generic QAPP document.

D1. FIELD DATA EVALUATION

Information pertaining to Field Data Evaluation is provided in the Generic QAPP document.

D2. LABORATORY DATA EVALUATION

Data qualifiers are assigned by the laboratory if necessary. Pace's data evaluation process can be found in their QAM provided in **Appendix B**. All other information is provided in the Generic QAPP document.

D3. DATA USABILITY AND PROJECT VERIFICATION

A Pace Representative will review and verify the laboratory data generated for accuracy according to the Pace QAM. Information on QC procedures is provided in the QAM. The QAM is provided in **Appendix B**. All other information is provided in the Generic QAPP document.

REFERENCES

1. Cardno. *Phase I Environmental Site Assessment Report – Former Monroe Street School, December 2016*.

2. U.S. Environmental Protection Agency. 2006. *EPA Guidance on Systematic Planning Using the Data Quality Objectives Process*. EPA 240/B-06/001. February.

3. U.S. Environmental Protection Agency. 2002. *EPA Guidance for Quality Assurance Project Plans*. EPA QA/G-5. EPA 240/R-02/009. December.

4. U.S. Environmental Protection Agency. 2006. *EPA Requirements for Quality Assurance Project Plans*. EPA QA/R-5. EPA 240-B-01-003. Reissued May.

5. U.S. Environmental Protection Agency. 2006. *Data Quality Assessment: Statistical Tools for Practitioners*. EPA QA/G-9S. EPA 240-B-06-003. February.

6. U.S. Environmental Protection Agency. 1998. *Quality Assurance Guidance for Conducting Brownfields Site Assessments*. EPA 540-R-98-038. September.

7. U.S. Environmental Protection Agency Region 4. 2010. *Brownfields Quality Assurance Project Plans (QAPPs) Interim Instructions Generic and Site-specific QAPP Addendum for Brownfields Site Assessments and/or Cleanups.* July 2010.

8. U.S. Environmental Protection Agency Region 4. 2013. *Field Branches Quality System and Technical Procedures*, http://www.epa.gov/region4/sesd/fbqstp/.

LIST OF ABBREVIATIONS

ABCA	Analysis of Brownfields Cleanup Alternatives
ACM	Asbestos Containing Materials
AOC	Area of Concern
AST	Aboveground Storage Tank
ASTM	American Society for Testing and Materials
BFA	Brownfields Agreement
bgs	Below Ground Surface
BS	Blank Spike
BSD	Blank Spike Duplicate
BSA	Brownfields Site Assessment
BSRA	Brownfields Site Rehabilitation Agreement
BTEX	Benzene, Toluene, Ethylbenzene, and Total Xylenes
°C	Celsius
CAB	Cellulose Acetate Butyrate
CD	Compact Disc
CESQ	Conditionally Exempt Small Quantity Generator
COC	Contaminants of Concern
CSA	Comprehensive Site Assessment
CTL	Cleanup Target Levels
DAO	(EPA) Designated Approving Official
DEFT	Decision Error Feasibility Trials
DO	Dissolved Oxygen
DPT	Direct Push Technology
DQO	Data Quality Objective
DRO	Diesel Range Organics
DWM	(NCDEQ) Division of Waste Management
e.g.	exempli gratia - for example
EPA	United States Environmental Protection Agency
EPH	Extractable Petroleum Hydrocarbons
ESA	Environmental Site Assessment
ECD	Electron Capture Device
FID	Flame Ionization Detector
GC	Gas Chromatography
GC-MS	Gas Chromatography – Mass Spectrometry
GIS	Geographic Information Systems
GPS	Global Positioning Satellite
GRO	Gasoline Range Organics
HAZWOPER	Hazardous Waste Operations and Emergency Response
HPLC	High Performance Liquid Chromatography
HSA	Hollow Stem Auger
ICP	Inductively Coupled Plasma
ID	Identification
IDW	Investigation Derived Waste

LIST OF ABBREVIATIONS

i.e.	*id est* - that is
IHSB	Inactive Hazardous Sites Branch
IUPAC	International Union of Pure and Applied Chemistry
Kg	kilogram
L	Liter
LCS	Laboratory Control Sample
LIMS	Laboratory Information Management System
LUST	Leaking Underground Storage Tank
MADEP	Massachusetts Department of Environmental Protection
MCL	Maximum Contaminant Level
MDLs	Method Detection Limits
MIP	Membrane Interface Probe
Ml	Milliliter
MNA	Monitored Natural Attenuation
MTBE	Methyl tert-butyl ether
MW	Monitor Well
MS	Matrix Spike
MSD	Matrix Spike Duplicate
NA	Not Applicable
NC	North Carolina
NCAC	North Carolina Administrative Code
NCBP	North Carolina Brownfields Program
NELAC	National Environmental Laboratory Accreditation Conference
NCDEQ	North Carolina Department of Environmental Quality
NCDENR	North Carolina Department of Environment and Natural Resources
NFAR	No Further Action Required
NOV	Notice of Violation
ORP	Oxidation Reduction Potential
OSHA	Occupational Safety and Health Administration
OVA	Organic Vapor Analyzer
PAHs	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated biphenyl
PCE	Perchloroethylene or tetrachloroethylene
PE	Performance Evaluation
P.E.	Professional Engineer
P.G.	Professional Geologist
PID	Photo-ionization Detector
PIN	Parcel Identification Number
PQLs	Practical Quantification Limits
PVC	Polyvinyl Chloride
PWR	Partially Weathered Rock
QA	Quality Assurance
QAM	Quality Assurance Manual

LIST OF ABBREVIATIONS

QAP	Quality Assurance Plan
QAPP	Quality Assurance Project Plan
QC	Quality Control
QEP	Qualified Environmental Professional
RAP	Remedial Action Plan
RCRA	Resource Conservation and Recovery Act
REC	Recognized Environmental Condition
RL	Reporting Limit
RPD	Relative Percent Difference
RQAO	Regional Quality Assurance Designated Approving Official
RSL	Regional Screening Levels
SESD	Science and Ecosystem Support Division
SPLP	Synthetic Precipitate Leaching Procedures
SRG	Soil Remediation Goals
SS	Soil Sample
SSQAPP	Site-specific Quality Assurance Project Plan
SW	Solid Waste
SVOC	Semi-Volatile Organic Compounds
SOP	Standard Operating Procedure
TAL	Target Analyte List
TCE	Trichloroethylene
TCL	Target Compound List
TCLP	Toxicity Characteristic Leaching Procedure
toc	Top of casing
TPH	Total Petroleum Hydrocarbons
TQM	Total Quality Management
USCS	United Soil Classification System
U.S. EPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UST	Underground Storage Tank
µg	Microgram
VOC	Volatile Organic Compounds
VPH	Volatile Petroleum Hydrocarbons

Tables

Table 1: Project Specific Data Quality Objectives (DQOs)

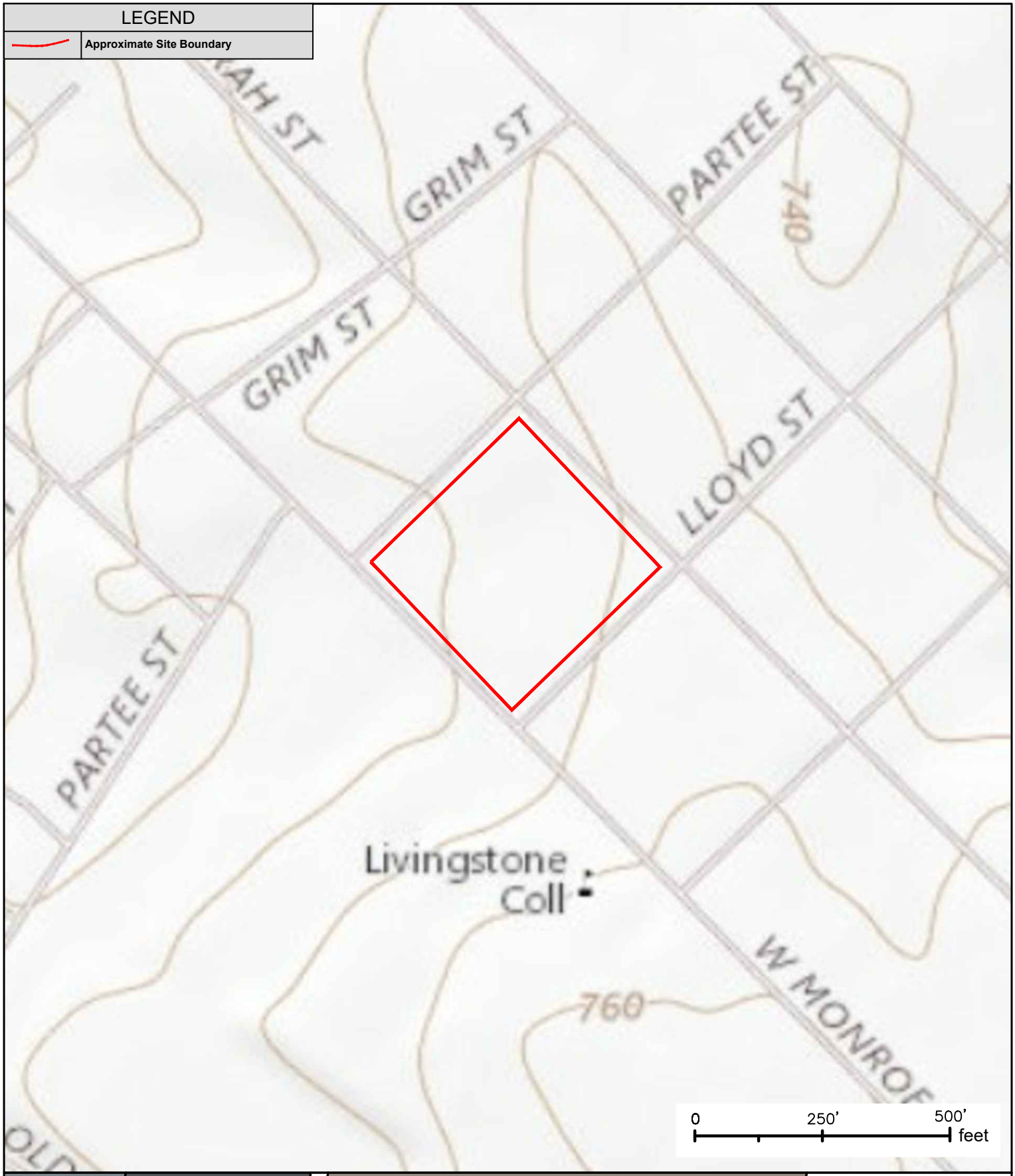
Data Quality Objective	Project Specific Action
State Problem	Real or perceived environmental contamination exists at the subject property associated with recognized environmental conditions (RECs), identified as the presence of an underground storage tank (UST) on the subject property and the former presence of a filling station on an adjacent, upgradient site from the subject property. The identified RECs may pose an obstacle to site redevelopment.
Identify the Decision	The principal objective of this investigation is to provide analytical data to evaluate potential contaminant source areas and exposure pathways. The data and data interpretation will answer the question: "Have the RECs identified on the Subject Property adversely impacted soil and/or groundwater at the Site?"
Identify Inputs to the Decision	Subsurface soil samples and groundwater samples will be collected to provide analytical data for Site characterization as detailed in Sections A6 and B1. Table 2 defines the sampling areas, analyses, and rationale.
Define the Boundaries of the Study	Spatial Boundaries: The investigation will be confined to the Subject Property. Temporal Boundaries: This assessment must be completed prior the expiration of the City's funding on September 30, 2021. Financial Boundaries: The assessment of the Subject Property is being conducted under USEPA Cooperative Agreement Number BF-00D72618-0 and shares funding with other high priority sites. Therefore, the investigative activities must be performed in as cost effective a manner as possible to ensure that all of the sites have adequate funding.
Develop a Decision Rule	The significance and nature of impacts to the areas of concern will be determined by direct evaluation of the analytical data generated. If analytes are not detected or are detected at concentrations below applicable NCDEQ and EPA RSLs, the Site is eligible for no further action. If analytes are found above regulatory criteria in the soil and/or groundwater, then the degree to which these impacts affect redevelopment of the Site must be evaluated. Further assessment and/or an Analysis of Brownfields Cleanup Alternatives (ABCA), which may evaluate remedial actions and/or institutional controls, would then be recommended.
Specify Limits on Decision Errors	Since variance of the data cannot be estimated at this time and the number of samples is restricted by financial considerations, a confidence limit of the data cannot be established. Results of the sampling data will be reviewed by Cardno to determine if additional sampling and/or remediation will likely be required by the NCDEQ. Cardno will work with the NCDEQ and other stakeholders to identify any areas where data gaps may exist before it can be determined how to render the Subject Property suitable for the intended re-use.
Optimize Design	The work plan is cost-effective and meets the needs of both the stakeholders and the regulatory authority. The scope of work is sufficient to determine levels of contamination present in different environmental media at the Site and the receptors they may affect. The sampling is designed to assess areas of environmental concern having the highest probability of environmental impairment based on available information. Each planned data point has justifiable reason for collection. The design was optimized to collect sufficient data to characterize the areas of concern while staying within budget and time constraints.

Table 2: Summary of Sampling Locations and Analyses
Former Monroe St. School
Salisbury, NC

Sample Schedule					
AOC	**Rationale**	**Sample Media**	**Total Samples**	**Analyses**	**Standard Operating Procedure**
UST Basin	Assess soil beneath the USTs	Soil - surface soil in base of UST basin	3	TPH GRO EPA Method 8015	SESDPROC-300-R1 Soil Sampling / NCDEQ UST Closure Guidance
				TPH DRO EPA Method 8015	
				TCL VOCs EPA Method 8260	
				TCL SVOCs EPA Method 8270	
				MADEP VPH	
				MADEP EPH	
	Assess groundwater at UST basin and from potential offsite source across Lloyd St.	Groundwater	1	TCL VOCs EPA Method 8260	SESDPROC-301-R1 Groundwater Sampling / NCDEQ UST Closure Guidance
				TCL SVOCs EPA Method 8270	
				MADEP VPH	
				MADEP EPH	
Off-Site / Adjacent UST Site	Assess soil contaminants from potential offsite source from across Lloyd St.	Soil - subsurface soil ≥1' from groundwater interface	2	TCL VOCs EPA Method 8260	SESDPROC-300-R1 Soil Sampling / NCDEQ UST Closure Guidance
				TCL SVOCs EPA Method 8270	
				TAL Metals EPA Method 6010	
				MADEP VPH	
				MADEP EPH	
	Assess groundwater contaminants from potential offsite source across from across Lloyd St.	Groundwater	1	TCL VOCs EPA Method 8260	SESDPROC-301-R1 Groundwater Sampling / NCDEQ UST Closure Guidance
				TCL SVOCs EPA Method 8270	
				MADEP VPH	
				MADEP EPH	
Mechanical Room Area	Assess soils around the mechanical room area	Soil - subsurface soil between 3'-5' bsg	3	TCL VOCs EPA Method 8260	SESDPROC-300-R1 Soil Sampling / NCDEQ UST Closure Guidance
				TCL SVOCs EPA Method 8270	
				RCRA Metals EPA Method 6010	
	Assess groundwater conditions around the mechincal room area	Groundwater	1	TCL VOCs EPA Method 8260	SESDPROC-301-R1 Groundwater Sampling / NCDEQ UST Closure Guidance
				TCL SVOCs EPA Method 8270	
				RCRA Metals EPA Method 6010	
QA/QC	Quality Assurance/Quality Control	Groundwater Duplicate	1	TCL VOCs EPA Method 8260	SESDPROC-300-R1 Soil Sampling / NCDEQ UST Closure Guidance
				TCL SVOCs EPA Method 8270	
				RCRA Metals EPA Method 6010	
		Soil Duplicate	1	TCL VOCs EPA Method 8260	SESDPROC-300-R1 Soil Sampling / NCDEQ UST Closure Guidance
				TCL SVOCs EPA Method 8270	
				TPH GRO EPA Method 8015	
				TPH DRO EPA Method 8015	
		Field Blank Aqueous	1	VOCs EPA Method 8260	SESDPROC-011-R4 Field Sampling Quality Control
		Trip Blank Aqueous	1	VOCs EPA Method 8260	
Totals		Total Soil:	9		
		Total Aqueous:	6		

Notes: 1. TPH analysis to be conducted first and results reported within 48 hours
2. Hold soils and if TPH results are reported >50 ppm GRO and/or >100 ppm DRO, then proceed with VOC, SVOC, VPH, and EPH analyses

Figures



Notes:

FIGURE 1 - TOPOGRAPHIC SITE LOCATION

Former Monroe St. School
1100 West Monroe St.
Salisbury, NC

Cardno
1812 Lincoln St., Suite 301
Columbia, SC 29201
803-929-6060

Notes:
1. Aerial photo from Google Earth

FIGURE 2 - AERIAL SITE LAYOUT

Former Monroe St. School
1100 West Monroe St.
Salisbury, NC

Cardno
1812 Lincoln St., Suite 301
Columbia, SC 29201
803-929-6060

Notes:
1. Aerial photo from Google Earth

FIGURE 3 - PROPOSED SOIL SAMPLE MAP

Former Monroe St. School
1100 West Monroe St.
Salisbury, NC

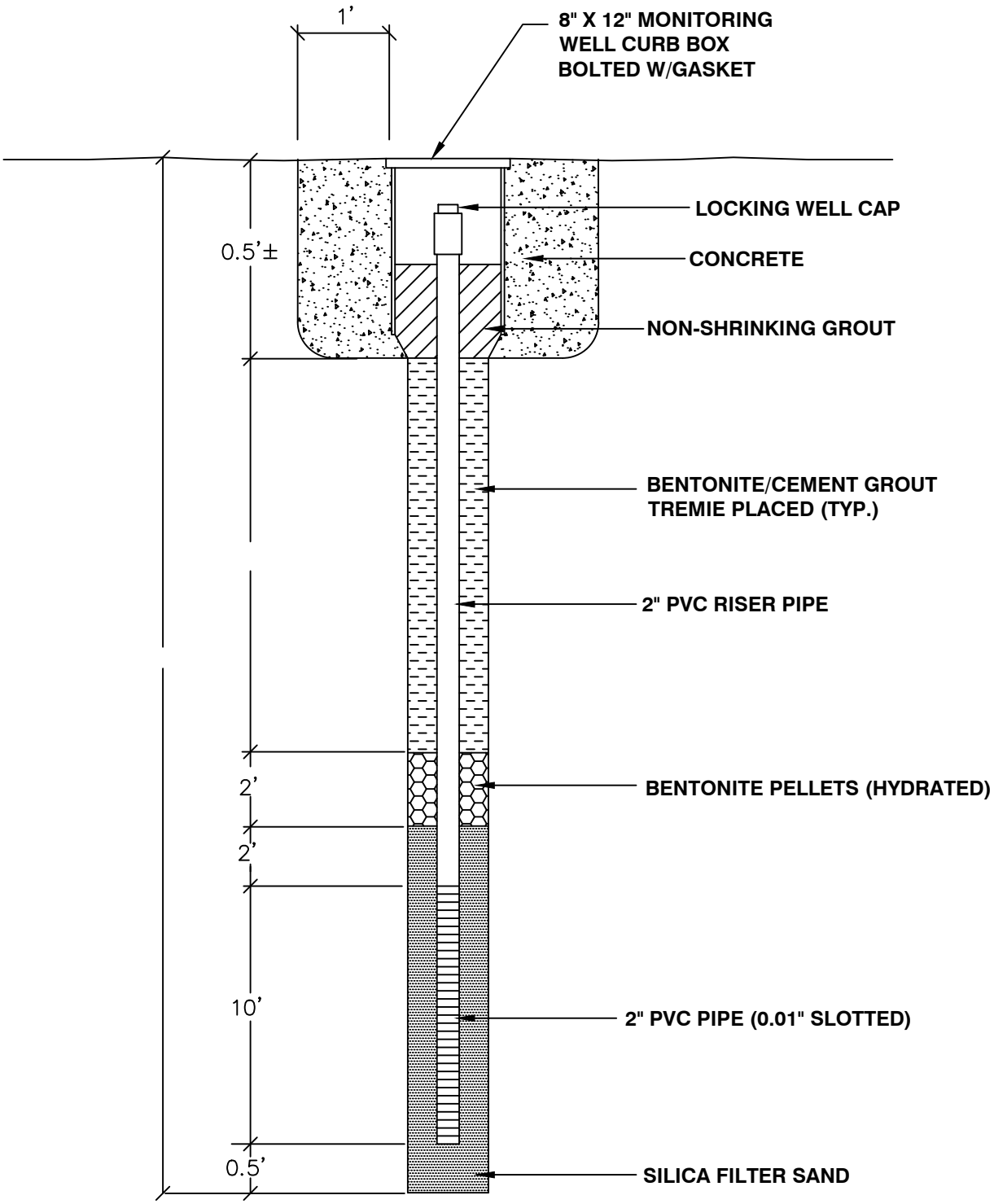
Cardno
1812 Lincoln St., Suite 301
Columbia, SC 29201
803-929-6060

Notes:
1. Aerial photo from Google Earth

FIGURE 4 - PROPOSED GW SAMPLE MAP

Former Monroe St. School
1100 West Monroe St.
Salisbury, NC

Cardno
1812 Lincoln St., Suite 301
Columbia, SC 29201
803-929-6060



Notes:
1. Figure not to scale (N.T.S.)

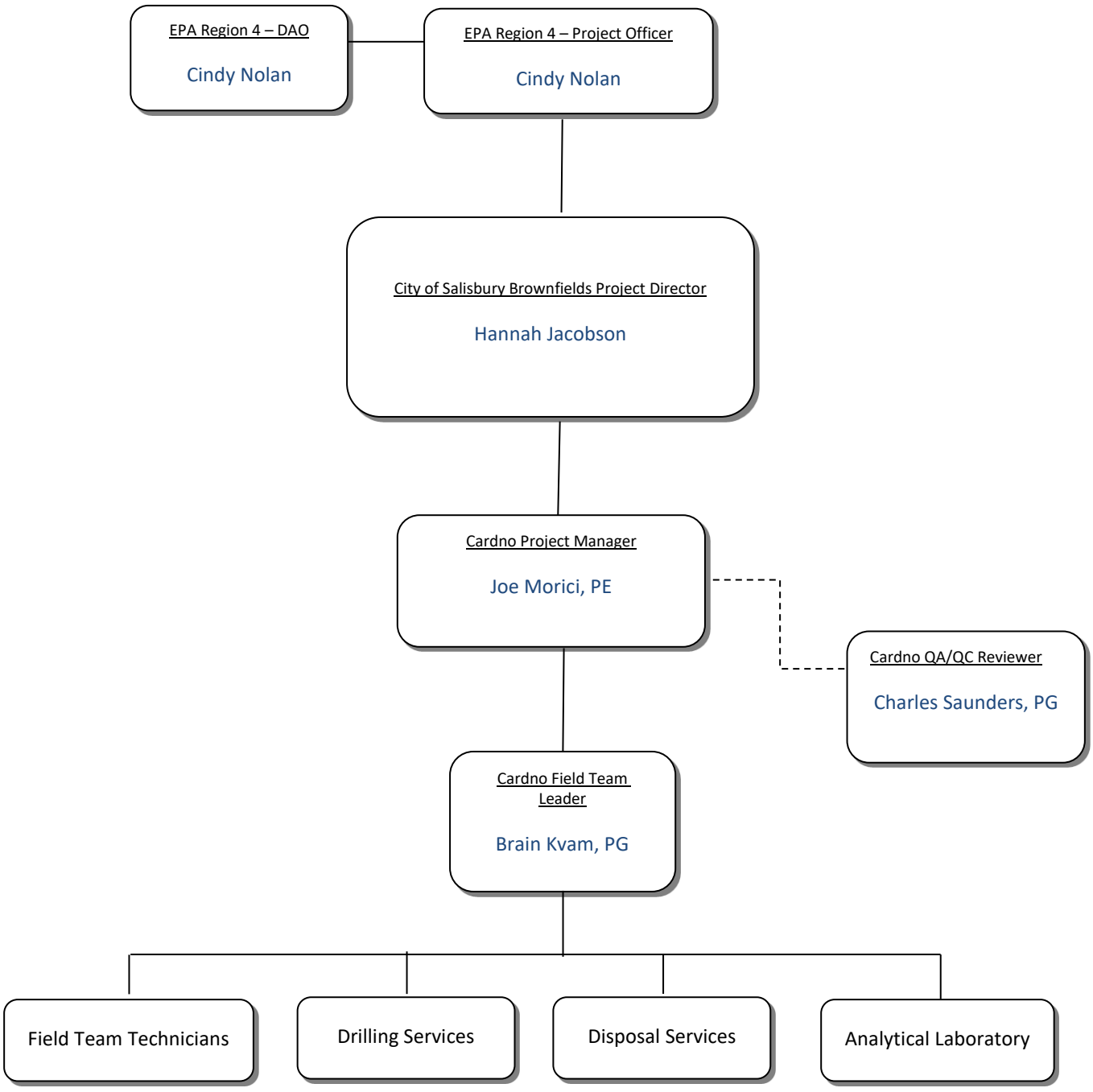
FIGURE 5 - MONITORING WELL SCHEMATIC

Former Monroe St. School
1100 West Monroe St.
Salisbury, NC

Cardno
1812 Lincoln St., Suite 301
Columbia, SC 29201
803-929-6060

Appendix A
Project Organizational Chart

PROJECT ORGANIZATION CHART



Appendix B
Pace Lab QAM